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ON SOME POINTS

OF

SCIENCE AND PRACTICE

CONCERNING

CANCER:

AN ADDRESS, DELIVERED AT THE ANNUAL INAUGURAL MEETING OF
THE MIDLAND MEDICAL SOCIETY AT BIRMINGHAM,
ON NOVEMBER 9TH, 1877:

BY

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Reprinted from the BRITISH MEDICAL JOURNAL, *February 16th*, 1878.

LONDON.
1878.

SOME POINTS OF SCIENCE AND PRACTICE CONCERNING CANCER.

MR. PRESIDENT AND GENTLEMEN,—Let me, in the first place, return you my best thanks for the very kind reception which you give me. If I came before you to-night as a great discoverer, conscious of having some most important new knowledge to communicate which would change the aspect of our science, I might beyond measure congratulate myself on an opportunity, such as not all great discoverers can obtain, of unfolding my valued acquisition before a large and cultivated audience. But, having no such budget to open, and feeling therefore much diffidence before this assembly which I have to address, I must remind you of your own responsibility for the flattering invitation which brings me here. In answer to that invitation, I have undertaken to put before you my line of thought on a subject which I believe you will not deem unimportant; but I fear that my treatment of the subject can hardly be such as to justify my presence here; and in proportion as this shall be the case, I would beg leave to count upon your indulgence.

The reflections which I propose to bring before you relate to the present state and prospect of our knowledge of CANCER. And my choice of the subject of cancer has been determined by two motives: one, that I personally feel, and have always felt, a particular interest in the subject; and the other, a consideration which I will hereafter mention. I do not apologise to you for having *written*, and intending to *read*, what I have to say on my subject; for, though I know it to be pleasanter hearing, as well as speaking, when the speaker has at most only to avail himself of slight notes, the subject of cancer is so very large, and offers so many sidings for digression, that, unless I strictly adhered to manuscript, I could not be reasonably safe in regard of time.

Most that I have to say will relate to the causes and treatment of cancer ; but it may be convenient that, in introduction, I refer, though very briefly, to two important movements of opinion which there have been within the last twenty or thirty years : first, with regard to the natural succession of facts in the evolution, if I may so term it, of a case of cancer ; and, secondly, with regard to the intimate anatomy of cancerous growths. And, before I start, let me say that throughout my argument I shall always use the word "cancer" in its old-fashioned surgical sense, intending it to cover all the various tumours and ulcers which we familiarly class as *malignant;* and the word "tumour", which often may include "cancer", I use restrictedly, in its pathological sense, as meaning only *tumour by process of growth.*

I. The men who within our times have theorised on the Evolution of Cancer, have equally had before them for explanation certain broad facts in the natural history of the disease. They have seen that the tendency of persons to suffer cancer runs with marked excess in particular families, or, in other words, is in a great degree hereditary. They have seen that the natural course of a cancer, left to itself, is to pass into indefinitely-extending processes of local destruction, which involve such flux of organic material as must sooner or later exhaust the general strength, and end the life, of the patient. They have seen that often before this course, as regards one cancer, can complete itself, other cancers are making progress in other parts of the patient's body, to the more rapid detriment of his life ; or that, at any rate, after his death, other cancers, more or less advanced, will generally be found in his body. And, not least, they have seen that surgical removal of cancer, whether by knife or caustic, is in general of no effect to cure the patient ; often because of the just mentioned presence of the disease in various other parts of the body ; often, also, because the disease recurs in or near the place of removal.

The older cancer-theory of our times—the theory which was in full bloom some twenty years ago, and is even now not quite extinct, interpreted those facts to about the following effect. It conceived the patient to have been *ab initio* the subject of a form of general ill-health or cachexia which disposed his entire body to form cancer, just as the entire body of a person incubating small-pox is disposed to form variolous pustules. His state before the cancer showed itself was a state of general cancerous tension. When a solitary cancerous tumour (say a skirrhous breast) came under surgical notice, it was regarded but as the partial effect of a diffused cause, the outward and visible sign of a tension to which it gave partial vent; and the many cancers, when they were seen, in lymph-glands and various other organs, were but the more perfect utterance of that original dyscrasy.

In this theory there was, as we now know, a large admixture of wrong inference. For the better theory which is now generally accepted in its stead, our profession has been mainly indebted to the staff of the Middlesex Hospital; in the first place, to Mr. Septimus Sibley's most instructive paper of pathological statistics, published in 1859, from the experience of the cancer-wards and deadhouse of the hospital, to which he had then recently been house-surgeon and registrar; and afterwards to the admirable practical teachings (too soon silenced by death) of the late Mr. Charles Moore and the late Mr. Campbell De Morgan, surgeons of the hospital.

The amended theory of cancer recognises no cancerous cachexia except such general ill-health as gradually results from the progress of cancer. It appeals to the fact familiar to us all—familiar even in a degree which often in a particular point of view makes the experience painful to us, that the person who comes to consult us with a cancer, a person whom we may at once see to be doomed to death within a year or two, is often to all appearance in rude general health. The theory does not necessarily pretend to explain the origin of the local disease which in such a case is brought to our notice; but, starting from that as fact, it argues what must result from it. Given, it says, the one primary cancer, all other facts of the case follow from it by logic of humoral sympathy; just as, in the story of syphilis, secondary and tertiary consequences need only the one hard chancre to account for them. The cancerous cachexia, like the syphilitic cachexia, is but an affair of *progressive infection;* essentially by the juices of the body —the lymph and blood, but sometimes also accidentally in other ways; an affair only of infection, of ever-widening infection, from the one first-established focus of disease. How that first focus came to be, and how it came to have its wonderful endowment of infectiveness, are questions which must be separately argued; but meanwhile, says the theory, let us frankly recognise that, where our cancer-patients show certain general signs of disturbed health, presumably this "cachexia" is the effect, not the cause, of the cancer.

II. Of late years, too, there has been change in the point of view in which pathologists have regarded the Anatomy of Cancer. Thirty years ago, cancer was supposed to be a specific new bodily texture, having (as cartilage or muscle has) an organisation proper to itself in contrast with other textures, and proper to it in all its forms. In those early days of modern histology, not all men who had picked up a smattering of Schwann were competent to understand the real physiological significance of his doctrine : and many a microscopist of those days talked of "cancer-cells" as he talked of nerve-cells and fat-cells ; professing that, by the visible presence or absence of these characteristic cells which he described, every tumour would declare itself malignant or non-malignant. This (in the sense in which it was meant) was an absurd twist to be given to pathology ; and I remember that even in 1847, in the first pathological lecture which I gave at St. Thomas's Hospital, I ventured to raise my voice against it. From across the North Sea, however, there was then happily beginning to be heard a voice far stronger than mine; and Virchow, rapidly laying the foundations of his now well-known system of textural pathology, soon consigned to the limbo of vanity those mare's-nest "cancer-cells" of the too easily satisfied preceding decennium. The profounder and permanent work which since that time has been done in the anatomy of cancerous and other tumours is of really immense amount—immense, even if we regard only the contributions which have been made to it in the German language; but even yet it is far from complete, and the generalisations to which at present it seems to point must of course be deemed subject to correction by further contributions as they come in.

It is impossible that on this occasion I should attempt to do justice in detail to even any of the more finished sections of that immense anatomical labour ; and I will only venture to describe in a few sentences what, up to the present time, seems to me their essential outcome. It seems that cancers have not, as was pretended, any one structure common to them all ; that, on the contrary, different species of cancer have structures as dissimilar as the structures of bone and muscle. One principle of similarity does, indeed, apply to them all ; not the principle of likeness *per capita*, but the principle of likeness *per stirpes*. Each primary tumour has characters impressed on it, and for the most part very emphatically impressed, by what we may call its particular local parentage. The different species represent different textural origins ; each texture which starts a primary cancer having, so to speak, a cancer proper to itself. Mucous and cutaneous surfaces and involutions, connective tissues, pigment-tissues, bone and periosteum, muscle-substance, lymph-gland, nerve-substance, and so forth: each has its own distinctive way or ways of growing primary cancer; and, as we study the whole range of cancerous tumours, from skirrhus to glioma, we seem to see that the growth of each makes itself only gradually divergent from the normal growth-type of the texture which it represents. And as each sort of primary cancer expresses in this way more or less clearly the organ which started it, so, of course, it is in intimate structural affinity with the non-infective tumours of the same organ; and I believe that the best histologists, when they contemplate the first textural beginnings of a cancer in any affected organ, see only such simple signs of textural overgrowth as might equally be the beginnings of a non-infective tumour.

In a certain sense, however, though a sense widely different from that of the doctrine of thirty years ago, we may still say that the various sorts of cancer have morphological characters in common; but the likenesses to which I here refer are likenesses rather of expression than of feature. Thus, for instance, it seems general to cancers that the overgrowing textural elements of which they primarily consist do not develop into ripe texture, but remain more or less immature; and that in some cases they exhibit a marked reversion to very early embryonic type. It seems also general to cancerous, as compared with non-cancerous tumours of respectively the same textural parentage, that, as they grow, their first textural type soon becomes obscured: on the one hand, by the crowding of forms which, in proportion as the process is vehement, will more and more be immature or embryonic; and on the other hand by evidences, which are sometimes extreme, of the tendency of the new growth to degeneration. On the whole, then, the knowledge which anatomy hitherto contributes to the explanation of cancer is but indirect, and rather negative than positive in its bearings. The anatomical forms explain nothing in regard of the property of infectiousness which is associated with them, and which, as I will hereafter show, constitutes the real puzzle of the disease. The anatomical forms are matters of mere local accident; but the infectiousness of the cancer represents its very cause.

III. As regards the extremely difficult subject of the Causes of Cancer, it may, I think, be said that of late years we have come to estimate more fitly the nature of some of the problems which have to be solved; and that, in consequence, some definite lines of study have begun to suggest themselves as tending, directly or indirectly, to throw light on the origin of the disease. Little as this progress may seem, it is, I think, not to be despised; and those who are studying the ætiology of cancer may derive the greatest encouragement, as also, I think, some most instructive suggestions, from a consideration of the wonderful advances which during the last dozen years have been made in the ætiology of tubercle.

1. A first and very strongly marked ætiological character of cancer is its preference for particular lines of hereditary succession. Superficially, it may appear that cancer in this respect only follows the lead of the non-cancerous tumours, for they also tend to run in family lines; but, on fuller inquiry, it seems little less than certain (at least so far as some of the best known forms of cancer are concerned) that cancer and the non-cancerous tumours are hereditary in two different senses. In the non-cancerous tumours, the hereditary influence seems to be the true and entire cause of the phenomenon; whereas, in some of our best known types of cancer, it seems only or chiefly to supply that part of the causation-compound which we familiarly call by the name of predisposing conditions: a distinction which, our studies of tubercle tend to show, may be one of most critical importance.

I have said that the hereditariness of the non-cancerous tumours, as compared with that of cancer, seems to be a simple matter. The non-cancerous tumours, in their most characteristic forms, belong, I believe, to the same pathological category as supernumerary toes and fingers; that is to say, they represent the same sort of idiopathic fault in the embryonic antecedents of the animal. They are local quantitative "monstrosities". True, they may not be ostensibly congenital, as the toe or finger is; but, though a part have not at birth any ostensible pleonasm of texture, not the less it may have in reserve the endowment which will afterwards evolve such pleonasm, a waiting-power like that with which the sexual organs remain undeveloped for the first sixth or seventh part of life; and the growth of the tumour, perhaps not becoming manifest till years after birth, illustrates, I believe, when at last it comes, the deferred exercise of a congenital endowment. As to this sort of anomaly, it can be no wonder that, amid the infinitely complex movements of force and matter which fulfil the scheme of embryonic development, sometimes this or that molecule divides itself not quite normally, or sometimes this or that molecule drops ever so little out of line, or sometimes there occurs unduly this or that divergence, or this or that confusion, of molecules. It is easy to conceive that, in immeasurably small errors of this sort, germinal antecedents may establish themselves for even the most startling malformations which adorn our museums; and, among such supposed molecular irregularities, the simplest we can imagine would be that, in the distribution of matter and force among so many millions of molecules, sometimes there results here or there a supernumerary or superpotential molecule. And, as regards the hereditariness of such errors, nothing is more certain as fact than that, when once the monstrosity exists, it is apt to be fixed and appropriated as part of the transmissible type of the animal. It is not only that the tendency to form (as the case may be) the supernumerary digit or the hypertrophic tumour runs in very marked degree in lines of hereditary succession, but that in both cases we sometimes see the local endowment cling to its place of manifestation with an obstinacy which is as characteristic as inheritance,—we see, namely, that the amputated supernumerary digit, or the cut-out non-infective fibroma of skin, tends to reproduce itself locally, even again and again, as if in local restitution of a normal type.

The marked hereditariness of cancer is certainly not to be explained on hypotheses as relatively simple as those ; and I do not think it to be yet proven that the hereditariness of cancer, is except sometimes in certain accidental respects, an attribute of the spot where the disease occurs.

2. A second ætiological character of cancer is the tendency which it apparently has, in some of its forms, to found itself (so to speak) on certain already existing local disorders. See, for instance, as regards epithelioma of the skin, the very numerous cases in which the chronic raw of a common mechanical irritation, having existed perhaps on and off for years as a mere inflammatory phenomenon, has at last, as the phrase is, "taken on malignant action". And, in the same point of view, as regards the terrible liability of the female sexual system to cancer, and the conditions which make womb and breast such apt soils for the cancer-eventuality, see, and especially at the one critical period of life, how vast a quantity of common irritative unhealthiness is suffered by the two organs as incidental to their decline of function.

It is worth notice that, in this ætiological direction, cancer seems to diverge considerably from the non-cancerous (hypertrophic) tumours ; for, in the pathology of the latter, it can hardly be said that any important part is played by circumstances of local irritation. It may, no doubt, be said that, in the vegetable kingdom, tumours on various parts of plants are found, in a very extensive range of cases, to arise where there is such irritant action as would in animals produce inflammation. There are the well-known and very numerous cases in which insects or acari give occasion to the tumours, on leaves and elsewhere, which are known by the name of "galls": cases, indeed, in which the animal avails itself of the plant's vital irritability to get housing of suitable pattern built for its young by the resentful efforts of the texture which it invades; and more recently it has been learnt that organic forms far below the status of insects and acari, and so minute as to be out of reach of any but skilled observation, may cause tumours of the same sort. Thus M. Davaine, investigating the gall of the Alpine rhododendron, in which a parasitic animal had in vain been looked for, finds, as the apparent cause of the tumour, a very minute fungus, with mycelium, pervading it; aad a Russian botanist, M. Woronine, finds that forms of the lowest (vibrionic) micro-fungi stand in apparently a like causative relation to tumours of the roots of certain plants—viz., of the alder and the garden-lupin. Cases like these are evidently frequent in the vegetable kingdom, and are perhaps to some extent represented among animals by those thickenings of texture which serve to encapsulate in the body for an indefinite time the cystic entozoa or the trichina; and also among animals a certain quantity of papillary or polypous outgrowth will sometimes be found associated with chronic inflammations of skin or mucous membrane: but, barring such doubtful exceptions, it would seem that tumour-formation of the merely hypertrophic kind is not apt to arise in the textures of the animal body in consequence of common irritation; and the relation of cancer to irritated parts would thus far appear to be *sui generis.*

3. Of all the ætiological characters of cancer, that which I think incomparably the most important is the property of infectiousness which its cause imparts to it, and which in fact makes the identity of the disease.

It is notorious that in a great variety of diseases which are primarily local (including many which we can ourselves start by inoculation for purposes of study) the primarily diseased part is able to infect other parts by means of the lymph and blood which it directly or indirectly transmits to them, and into which it has shed its contagium; and, in the case of cancer, evidence has long existed that those are the essential means by which the disease, when once started at any spot, tends to produce secondary and tertiary cancers in other parts of the body. Molecules, larger or smaller, of the primary cancer are always apt to be contained in the outflowing lymph and blood; and, in particular cases, the growth intrudes into veins with masses which are visible to the naked eye, and bits which detach themselves pass on with the blood till they become fixed as embola in smaller vessels.

Secondary and tertiary cancers, beginning to show themselves in the organs which have been infected from the primary seat of the disease, invariably imitate in their structure the particular structure, whatever it was, of the primary cancer—the epithelioma, the glioma, the fibro-sarcoma, or what not; and commonly they imitate it with an exactness which extends even to its minute individual peculiarites. When this remarkable fact is taken in connection with that other, which I just before mentioned, of the frequent passage of shaped texture-elements from the primary cancer into the lymph and blood, the simple theory at once suggests itself, that secondary and tertiary cancers are the outcome of a kind of natural budding-process from the primary; that living cancer-elements, floated from the one place to the other, and carrying with them a strong germ-power of their own, affix themselves as parasites to the textures which they reach, and grow there to an unlimited extent, in forms which (from the nature of the case) repeat exactly, as would vegetable grafts, the features of their parent stock. This explanation of the secondary and tertiary growths in cancer would seem to have some warrant from its simplicity; but though, as matter of fact, it seems certain that in some cases transported bits of cancer-tissue do really engraft themselves in new sites in the manner which the theory describes, such graftings appear to be quite exceptional, and their result, as regards the growth of the grafts, is questionable.

The process in which the secondary and tertiary growths in general arise is apparently of a zymotic kind; and certain observations relating to it which have been made by Dr. Creighton seem to me of quite singular interest with regard to the genesiology of cancer. In the course, namely of some elaborate cancer-studies which were made by him under the Lords of the Council—studies which it was my great good fortune to be able officially to promote, Dr. Creighton made much minute investigation of secondary cancer-nodules in liver and lymph-glands, and of various other secondary and tertiary cancers; and the explanation, which this research has seemed firmly to establish, of the meaning of such consecutive nodules, is, not that they represent the primary disease propagating itself by offshoots to new parts, but that they are autochthonic growths of the parts where they occur. It appears that, under the contact-influence of matter from the primary cancer, the textural elements of the next-affected organ pass, by successive changes of their own, into growth of a new sort, by which, as it advances, the secondary nodules are gradually evolved into their wonderfully close textural imitation of the distinctive texture of the primary disease. Almost invariably this imitative growth seems to be not in any degree modified by the anatomical type of the organ in which it occurs: Dr. Creighton's single (but only partial) exception being the case of the ovary; which organ, when secondarily cancerised, seems able to add more or less cyst-formation on its own account to whatever cancer-type it has got by contagion.*

The spreading of cancer by such a process as Dr. Creighton describes must certainly be regarded as one of the most curious of all hitherto observed facts of contagion. Pause and consider what it signifies. The primary cancer, anatomically regarded, is a definite original texture of the body, growing a modified process of growth, in which, notwithstanding its modification, the original type of the texture can be identified; and now this modified texture is seen to possess the marvellous endowment, that, coming into inoculative relations with other textures of the same body, it compels those second textures to abandon their own textural identity, and heterologise themselves to the textural pattern of the tumour. Think how, as we watch in different cases the workings of the contagium of cancer, we see the unity of that principle expressed in infinite variety of results—see the skirrhus of breast, or epithelioma of lip or tongue, counterfeited by the textural elements of the infected lymph-gland,—see some melanotic sarcoma of the chorioid, or some follicular form of bowel-cancer, reproduced by the cells of the infected liver,—see the infected lung representing some osteo-sarcoma of the femur or some cysto-chondroma of testicle! And as we contemplate, in the light of Dr. Creighton's observations, the local progress of the primary disease—say, some glioma of the retina, or some round-celled sarcoma in a limb, we become, I think, better able to understand the meaning of that singular so-called "infiltrativeness" which it possesses, as compared with the merely displacing power of (say) a large fatty tumour or a large collection of hydatids: an "infiltrativeness" with which it seems to abolish, but not by stretching, the various barrier-surfaces against which it comes; an

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* Dr. Creighton's valuable papers, which I hope will some day have separate publication, are meanwhile to be found in the *Reports of the Medical Officer of the Privy Council and Local Government Board*, New Series, Nos. iii, vi, viii.

"infiltrativeness" which, it would seem, may be nothing else than the circumferential contagious working of the cancer on the elements of each texture which it reaches.

I need hardly say that the ultimate meaning of these strange phenomena is beyond our present powers of explanation. Dr. Creighton's facts tend irresistibly to remind one of the molecular changes in sexual impregnation. As one sees the emigrant forms of the primary cancer melt away in the lymph-gland to which they have been borne, and then the texture of that lymph-gland begin a series of developmental changes which will eventuate in a new presentation of the parent disease, one's mind recalls the original working of the spermatic force which called the whole organism into being, and one is tempted to speculate whether, perhaps, the essential power of the "malignant disease", its power of specific fertilisation, may really be that the part has in activity in it, under unexplained conditions, some normal or abnormal survival of that ever-marvellous first ferment. But, if there are points of view in which that sort of speculation might seem to find encouragement from facts, and perhaps especially as regards the more fungific cancers of early life, other points of view, especially as regards skirrhus and the other epitheliomata, seem to me to suggest a widely different, though not necessarily incompatible, line of speculation. Remembering how our patient in extremity of advanced syphilitic poisoning, with tertiary gummatous tumours widely diffused among the organs of his body, tells us of the little chancre-inoculation ten years ago from which this general tumour-formation has resulted; and remembering the equally demonstrable contagium of tuberculosis, and the profuse (though only miliary) tumour-formation which this contagium specifically promotes,—can we, with those cases before us, feel sure that no analogous exterior influence, nothing of the nature of a morbid poison, is concerned in the causation of cancer?

Our present ætiological position seems, in short, to be this. In the genesis of the primary cancer, we have evidence of two forces: one, the natural growth-power of the texture, the other a power which is at least relatively foreign; and the cancer, which will act zymotically on other organs, expresses the co-operation of those two powers. Whether the process, as regards its unknown factor, depends, directly or indirectly, on some contagium from the outer world, or is from first to last merely the abnormal play of forces native to the body, is the question which waits to be solved. In our present imperfect state of knowledge with regard to many of the requisite elements for judgment, it would, I think, be unwise to attribute impossibility to either of the alternatives. In relation to them both, as well as to other conceivable hypotheses of cancer, our scientific need and duty is to continue observing, as accurately as we can, every local and personal and hereditary condition which may seem to act, either attractively or repellingly, on the factor which it is our aim to understand; and of such indications there are already some which I think valuable. Thus, for instance, the fact (above noted) that cancer has marked affinity for organs which are already in certain accidental ways disordered, seems to show that the unknown exciting cause either is not native to the body, or at least is not specially an attribute of the texture in which the disease breaks out. And the fact, as it appears to be, that cancer, though eminently contagious from part to part in the affected body, can hardly, if at all, be communicated to any other body, even among animals of the same sort, by artificial inoculations, injections and transplantations, seems to say—first, that the unknown factor in cancer can only operate where certain general predisposing conditions exist,—and, secondly, that cancer is perhaps not an hereditary disease, except as regards those predisposing conditions.

IV. In coming now to the Treatment of Cancer, I come to what I cannot but describe as hitherto matter for most painful contemplation. We practically have no treatment of cancer (in the sense of curative or preventive treatment) except such as consists in endeavours, in selected cases, to extirpate it with knife or caustic. In a very large majority of cancer-cases, probably more than three-fourths of the entire number, there can hardly be any serious thought of recourse to this one expedient; sometimes because of the original locality and perhaps visceral relations of the disease; sometimes because the cancer, since its origin, has made too much progress; and sometimes because of conditions concerning the patient's general health. To knife or caustic, the sole present resource of our art, we, therefore, can only resort in favour of the much smaller proportion—probably not as much as one-quarter, of our cases. And, in regard of this favoured minority, what is the good which surgery can promise? First, it can promise a microscopical hope—a hope which, on the whole, is so small as to be scarcely distinguishable from despair, that the disease will be radically cured by the operation. Secondly, it can hold out hopes, the exact nature and the strength of which will differ very greatly in different cases, but which, at their very best, are only hopes of palliation:

sometimes the prospect that, under circumstances which otherwise threaten very speedy death, immediate, though only brief, respite will be obtained; sometimes the possibility (more or less) that such real check will be given to the disease as may sensibly affect the duration and (for longer or shorter time) the comfort of life; sometimes the object that particular local horrors of the disease will, if even only for a very short time, be abated. All this, taken at its best, is but poor measure of comfort for us to be able to give in respect of a disease so frequent and so dreadful as cancer. And even as much as this for but one-quarter of the cases!

Of late years, hopes have been expressed that perhaps the general prospect as regards these cases may improve under a more vigilant and strenuous application of the doctrine which we owe to the Middlesex Hospital. The opinion that cancer is at first a merely local disease implies, of course, that every endeavour should be made to remove it before it ceases to be merely local; and the line of practice which has of late been recommended in that view is in substance this:—"Except so far as there may be in the individual cases special reasons to the contrary, operate, at the earliest possible moment, with knife or caustic. as searchingly and extirpatingly as you can, on every tumour or sore which you think cancerous; and, if there be any reappearance of the disease, whether at its first site or in the lymph-glands or elsewhere, operate again to the like effect, and, should occasion arise, again, and again, and again."

As regards my estimate of that rule, I need hardly observe that injudicious persons, purporting to give effect to it, might do very objectionable things under the name of surgery; for you will observe what vastly important qualifications are involved in the exceptions of the rule. But I would not seem to dispraise the rule merely because it is difficult to apply, and therefore leaves wide room to abuse. I would judge it as in dry principle, and as if it could always receive the best possible application—such application as it would have had at the hands of Mr. Moore and Mr. De Morgan themselves, if their lives had not been cut short. And, looking thus at the rule, what are we to say of it? is it a rule which can be practically applied with any large measure of success?

So far as the arguments in its favour are speculative, I doubt whether they would justify much more hope of preventing the secondary cancerous infection by removal of the primary cancerous tumour or sore than we should have of preventing secondary syphilis by removing the primary inoculation-spot when already it had declared itself a hard chancre; whether in the one case, more (or much more) than in the other, we could expect to interpose effectively between a diseased organ and its lymph-glands, or between it and the blood, at a time when the primary infective disease had already become manifest to our senses. And particularly I should doubt whether the repeated recurrence to operations could be expected often to succeed; whether the operators would not be too closely imitating Mr. Lowe's famous Hyperboreans, who, in their horror of the north wind, travelled ever more and more to the north, in hope that at last they would get to the rear of it.

But I would not pretend to answer the real question with arguments of a speculative kind. Whether a greatly more ardent practice of operating for cancer than was in favour with our best surgeons of twenty to thirty years ago would prove itself an advance in surgery: whether our operative policy towards cancer ought to be in general (subject to proper exceptions) *aggressive*, or in general (subject to proper exceptions) *expectant:* these are questions to which no safe answer can come, except from the teachings of experience; and many years must elapse, and the experiences of many men be put together, before the answer can be given in an exhaustive arithmetically exact manner.

But, be that answer what it may, we meanwhile have the pain of knowing that even the eminent authorities whose names are most identified with the advocacy of early and (in cases of relapse) repeated operations express almost no hope of radically curing the disease by such treatment. Mr. Moore, when last discussing in print (1870) the grounds on which, in his opinion, operations for cancer might be advised, expressly said that the notion of eradicating the disease by operation can but rarely sway the mind of surgeon or patient; for that, though there have been instances in which cancer of the lip, and more rarely of the breast, removed by operation, has not, even after many years, reappeared, such cases, on account of their rarity, can have but little influence in the decision. Mr. De Morgan, again, in the famous discussion on cancer of 1874, spoke of the "all but certainty of the disease's recurrence, remove it as we will". And this phrase of his drew an instructive comment from Sir James Paget: "I do not know", said Sir James, "what percentage *almost* means; but I will venture to say, speaking of ordinary typical cancer of the breast, or any other part which is its most frequent seat, that the number of cases in which it does not recur is not more than one in five hundred."

Now, accepting as of unquestionable authority those gloomy statements with respect to the relapse of primary cancers after removal, what but far gloomier statements can we expect with respect to the hopefulness of subsequent removals? And, returning from these details to the general statement with which I started, how can we not feel that the powerlessness of surgery in relation to cancer is a pain, if not even a reproach, to all of us?

It seems to me imperative, under the circumstances, that we should look about, with all the best intellect of our profession, to see if this state of the case cannot be amended. Little as I can myself hope ever to contribute to the object, I would at least desire at this opportunity to say how pressingly important an object I consider it; and I will even venture to make some remarks on the studies which I think should be made in the matter.

Unless we suppose cancer to be in its nature incurable and unpreventable, we may conceive its cure or prevention becoming possible in either of the two following ways. (1) In proportion as the natural history of the disease shall be scientifically understood, definite indications as to curing or preventing it will be the natural counterpart of its pathology, and the resources, as they may then be, of practical medicine will be appealed to in an intelligible form; or (2) there is the chance—for it is no more than a chance—that, before full scientific insight is obtained, clinical experiments, more or less speculative, or even some discovery more or less accidental, may bring to light a specific antidote to the disease. Laboratory researches on the one hand, tentative therapeutics on the other, are, therefore, our two great lines of work; and to each of them I would give a few words.

1. Of Laboratory Researches, three chief sorts are requisite: the histological, the chemical, the ætiological.

a. In histology, notwithstanding that so much work has been done, the initial stages of tumours, both cancerous and non-cancerous, have yet to be very much further investigated: on the one hand, the embryology (so to speak) of each primary tumour as collated with the structure and developmental antecedents of the organ which bears the tumour; and, on the other hand, as in extension of Dr. Creighton's admirable work, the morbid changes which first arise in the lymph-glands and other seats of each sort of secondary infection.

b. In the chemical investigation of tumours, our work is yet all to do, and offers, I think, as regards cancer, a most promising field for the worker. Particularly we want the exact chemical comparison of cancers in their riper stages with the normal organs which appear nearest akin to them ; as, for instance, the comparison of masses of developed glioma with masses of (as near as may be) kindred normal brain-substance.

c. And not least, in laboratory work, we want continued exact researches into the essence of the infective process which multiplies cancer : such researches as those which, within the last dozen years, have so largely increased our knowledge of tubercle ; researches, I mean, conducted by experiments on living animals, with regard to the intimate conditions of the specific infection. In recommending studies of that sort, I am not unaware, nor do I regard it as unimportant, that they inevitably involve a certain amount (which happily in the present case would not need to be a large amount) of suffering to the animals which are used for experiment. But, as cancer, one of the most dreadful of diseases, is one which affects both man and brute, so it may very greatly concern the permanent interests of brute as well as man, that, even at some present cost to the brute, those studies should be diligently followed. And if we—students of Nature and servants of mankind, acting under the best light of our individual consciences and of the collective conscience of our great profession, are ready, for the sake of human interests, to impose that first cost of brute suffering, let us hope that the caprices of impulsive legislation, and the personal discretion of successive Secretaries of State, may not render such studies virtually impossible in England to all but clandestine investigators. Let us hope, too, that, amid our serious work, the Bacchanals of an ill informed enthusiasm, inflamed by calumny, may not rage to re-enact on some of us followers of Æsculapius the unmerited mutilation of Orpheus :—

> " Whom universal Nature did lament,
> When, by the rout which made the hideous roar,
> His gory visage down the stream was sent,
> Down the swift Hebrus to the Lesbian shore."

2. As regards Tentative Therapeutics, I am very strongly of opinion that, situated as we now are in relation to the treatment of cancer, our practice, in regard of cases which we do not submit to operation, ought to be systematically planned as a consistent search for more effectual treatment. Each of us should, I think, often take stock in his mind as to therapeutical resources hitherto not tried against

cancer; and should, at all proper opportunities, and with the best provisional light which the pharmacology and pathology of the time can give, make for himself successive new endeavours to find a "specific" for the disease.

By "specific", I mean in principle some influence (positive or negative) which shall be *electively* hostile to the cancer, shall be a power against the life of the cancer without being a power against the life of the body. Our Pharmacopœia contains, we know, a large number of agents, such as chloride of zinc, which, so far as they can be applied to any given cancerous mass, will destroy it ; but agents which do this only in respect of their being common caustics, *operating on diseased and healthy textures alike*, are evidently of no different intention from the knife ; and to ring for ever the changes on *common* caustics, is not to touch the question of *specific* treatment. (Comp. John Hunter's Lectures, Palmer's edit., vol. i, p. 625.) And what I here argue in regard of the local treatment of cancer is equally to be applied when we consider the possibility of acting on cancer by internal remedies : for any treatment which operates through the blood has opportunity according to its nature to affect every organ of the body ; and it would be no medical gain to poison the cancer to death if our poison were equally effective on the rest of the organisation.

In advocating the search for a "specific", I do not propose that men should refrain from knife or caustic in cases where they believe that they can clearly see their way to advantage from either ; and I, of course, fully recognise that at present, in a certain number of cases, we really have no proper alternative but to operate ; but, referring to the statement which I before made as to the very large number of cases in which no question of operation can be entertained, I would remind you that, even in the hands of those who are warmest advocates for operating, there must remain of necessity an immense field for trial of other modes of treatment. And let me illustrate this with reference to a particular line of experimentation, where probably the results (positive or negative) could be obtained with far more rapidity than in any other line.

Supposing the materia medica to contain a specific for the cure of cancer, how would you know that it deserved its name? By what test would you measure its action? No doubt we should see, under adequate internal administration of the drug, that the existing cancerous tumours, primary and secondary, affected by it through the blood, would shrink and vanish as syphilitic gummata shrink and vanish under the internal druggings which are appropriate to them ; and nothing short of this would prove that we had a specific for cancer. But though full proof would not exist on any less showing than that, presumptive evidence (positive or negative) might often be got on far less elaborate showing : that is to say, if there existed such a specific as I suppose, very probably its characteristic action might be to some extent tested by the behaviour of any particular cancerous sore to which it were judiciously applied — just as, in the case of syphilis, we know the great local potency of mercurial preparations. Suppose that, experimenting in succession on a number of non-caustic drugs, as direct applications to cancerous sores at the surface of the body, we at last came on a drug which in a series of cases showed itself able so to "change the action" of cancers to which it was applied, that under its use the cancerous fungation would cease, and the cancerous sore would heal, evidently we should have hopeful reason to try whether the same drug, internally administered, would produce like effects through the blood, and would accordingly admit of successful use against visceral and other deep cancers to which it could not be directly applied.

In thus mentioning a particular line in which I believe that important therapeutical observations might easily be made, my intention is only illustrative, and I do not attempt to enter on detailed suggestions. I am content to have shown one direction—no doubt there are many others—in which most of us could constantly be making new therapeutical endeavours : for every man, with much surgical practice, is often having under his care cases of open surface-cancer, at the breast or elsewhere, with which, under present circumstances, he does, therapeutically, next to nothing ; and, if his mind were made up as to any new agent he would wish to try, cautious separate use of it as a dressing to such sores or to parts of them—cautious, of course, not only as regards the sore, but also as regards the general action of the drug, would soon furnish him with a series of facts, out of some of which, sooner or later, important hints for progress might come. That particular suggestion, however, is, I repeat, only incidental to the main argument which I am desirous of pressing. My only essential point, let me emphatically say, is the one of general principle : the principle that we have to go to work on new lines, and with all our might, in respect of the treatment of cancer.

Gentlemen, among the moral qualities which go to make a great doctor, the very foremost, in relation to efficiency in practice, is a noble reluctance to be beaten. With a genius of untiring endeavour which may be summarised as "never say die", with a happy temperament of obstinate hopefulness, he fights for his patient to the very death, and, like a late eminent prize-fighter, if again and again knocked over, again and again "comes up smiling" to the scratch. You all know what a quality that is in the routine practice of medicine: how the strong man of our profession seems almost to hold back patients from ~~the grave~~ death by the contagion of his own hopefulness—aye, and that again and again, by his efforts, he seems to win back the apparently for ever lost, and (like an older athlete than the one I just quoted) brings home "Alkestis from the grave". This great quality of the best minds in our profession, so constantly, so vigorously exercised in regard of cases which are recognised as curable, is naturally least appealed to in detail when cases stand in masses in the opposite category, generalised as hitherto never cured. But, gentlemen, is it therefore dormant in regard of such cases? Is it not on the contrary rather felt by us all that, just in proportion as the individual claim on us seems to slacken where there are those long traditions of despair, so much the more a claim is created that the collective case should be met by our collective exertions, and that, as regards every such problem of so-called "incurable disease", the whole mind of the profession should be resolutely, almost indignantly, at work? I am particularly glad to have had the opportunity, which this evening has given me, of appealing, as regards cancer, to that strong common instinct, which I have described, of our professional heart, and of appealing to it in the presence of so many of whose sympathies I feel myself secure. And let me now say that the reason which, as additional to my own interest in the subject of cancer, led me to choose that disease as the matter on which I should speak here to-night, refers, in connection with this feeling, to the nature of your Midland Society.

The subject of cancer—partly from its very large extent and various branchings as a pathological study, and partly from the distribution of cases (which are material for study) among all practitioners of our profession, is a subject which almost absolutely requires to be worked, at least in several of its parts, by the co-operation of many persons; and I would submit that it might, with peculiar advantage, be taken up by such a Society as this for concerted work under a well-organised committee.

Medicine, as every one knows, is entirely a science of observation; and any man who would pretend to improve it, except from the basis of facts, is an anachronism from days before Lord Bacon. But "facts", to be the basis for medicine, must be *real* facts, must be *complete* facts, must be *well-defined* facts ; not fancies of facts, not fragments of facts, not nebulæ of facts ; and scientific facts can never be established as such for joint use, except where individual experiences, brought face to face with each other, and acting in check of each other, are rectified to a common standard of description as complete as the knowledge of the time permits, and are expressed with uniform nomenclature and in harmonious methods.

With regard to cancer, moreover, it is of particular interest that the two classes of work, which I distinguished as laboratory-work and therapeutical work, should be brought into intimate correlation : that the practising physician and surgeon, who may himself be unable to keep pace with the daily advances of histology and organic chemistry and experimental pathology, should be able to refer to laboratories where such advances are fully represented as well as appreciated ; that the laboratory-worker should be able to get from the physician and surgeon, not only the physical thing which he may want to study, but the circumstantial knowledge which may be requisite to interpret it ; and that, under joint auspices, representing the best strength of our science in each of the two great branches of work, contributions, which may be turned to universal account, should be sought in all directions, and be made matter of record and publication.

Science, says the late Sir John Herschel, is "the knowledge of many, orderly and methodically digested and arranged, so as to become attainable by one"! With regard to cancer, as I think on the one hand of the vast quantities of experience, or, let me rather say, of raw materials for experience, which in this country of ours are daily running to almost absolute waste for want of some sort of organisation by which they might be shaped into "science"; and as I think, on the other hand, what a Society like this might accomplish by such machinery as you could command, I see a contrast which I can only parallel by quoting the familiar antithesis of certain two possibilities of carbon : the smoke which merely obscures our day-time, and the lamp which serves as sunshine to our night.

And here, gentlemen, I conclude. That, from this great city—the birth-place and home of so many strong and wise men, the centre of so many industries, the vigorous representative organ of so much that is worthiest in English life, there may some day come help to mankind in the conflict in which our enemy now prevails against us, is the wish, the very hearty wish, with which I bid you my respectful farewell.